

AD-A099 092

BAKER (MICHAEL) JR INC BEAVER PA  
NATIONAL DAM INSPECTION PROGRAM. PURDY (STUMP POND) DAM. (NDI N--ETC(U)  
FEB 81 J A DZIUBEK

F/G 13/13

DACW31-81-C-0011

NL

UNCLASSIFIED

1-1  
4-1  
10-1-10-1



END  
DATE  
FILMED  
6-81  
DTIC

AD A099092

**LEVEL**

**P**

SUSQUEHANNA RIVER BASIN  
SALT LICK CREEK, SUSQUEHANNA COUNTY  
PENNSYLVANIA

**PURDY (STUMP POND) DAM**

NDI No. PA 00063

PennDER NO. 58-11

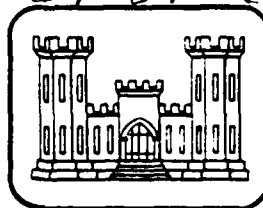
Dam Owner: Pennsylvania Fish Commission

DTIC  
SELECTED  
MAY 18 1981  
C

**PHASE I INSPECTION REPORT**

**NATIONAL DAM INSPECTION PROGRAM**

DACW 31-81-C-0011



prepared for

**DEPARTMENT OF THE ARMY**

**Baltimore District, Corps of Engineers**

Baltimore, Maryland 21203

prepared by

**MICHAEL BAKER, JR., INC.**

Consulting Engineers

4301 Dutch Ridge Road

Beaver, Pennsylvania 15009

February 1981

ENTRUSTED TO THE CARE OF  
Approved for Release  
Distribution

NTIC FILE COPY

\*Original contains color  
plates. All NTIC reproductions  
will be in black and  
white\*

81 5

410 795  
18 050

SUSQUEHANNA RIVER BASIN

PURDY (STUMP POND) DAM  
SUSQUEHANNA COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI No. PA 00063  
PennDER No. 58-11

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM.

*Purdy (Stump Pond) Dam. (NDI No. PA 00063)  
PH I - IIR PennDER No. 58-11  
Susquehanna River, Susquehanna County, Pennsylvania*

Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.  
Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

Feb 1981

DISTRIBUTION STATEMENT A

Approved for public release;  
Distribution Unlimited

## PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

1

Accession for	
NTIS AD-41	
DTIC TAB	
Unannounced	
Justification	
By	on file
Distribution	
Availability	

A

PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Purdy (Stump Pond) Dam, Susquehanna County, Pennsylvania  
NDI No. PA 00063, PennDER No. 58-11  
Salt Lick Creek  
Inspected 27 October 1980

ASSESSMENT OF  
GENERAL CONDITIONS

Purdy (Stump Pond) Dam is owned by the Pennsylvania Fish Commission and is classified as a "Significant" hazard - "Small" size dam. The dam was found to be in fair overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will not pass the 100-year flood without overtopping the dam. A spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF) is required for Purdy Dam. Because the dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF. During the 100-year flood, the dam is overtopped by a maximum depth of 4.32 feet for a total duration of 40.83 hours. The spillway is therefore considered "Inadequate." It is recommended that the owner immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

Several items of remedial work should be immediately initiated by the owner. Item 1 below should be completed by a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

- 1) Initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.
- 2) Fill the erosion gully at the right downstream abutment of the dam and reseed the area.
- 3) Remove the debris and silt at the entrance to the spillway.
- 4) Provide means to draw down reservoir during an emergency.

PURDY (STUMP POND) DAM

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. A plan for emergency drawdown of the reservoir should be developed in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

MICHAEL BAKER, JR., INC.

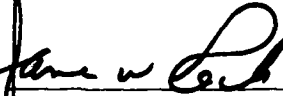


John A. Dziubek, P.E.  
Engineering Manager-Geotechnical

Date: 19 February 1981

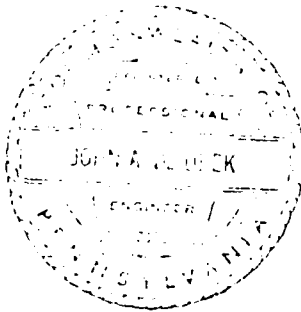
Approved by:

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS



JAMES W. PECK  
COL, Corps of Engineers  
District Engineer

Date: 13 MAR 81



PURDY (STUMP POND) DAM



Overall View of Dam from Left Abutment

## TABLE OF CONTENTS

	<u>Page</u>
Section 1 - Project Information	1
Section 2 - Engineering Data	4
Section 3 - Visual Inspection	6
Section 4 - Operational Procedures	7
Section 5 - Hydraulic/Hydrologic	8
Section 6 - Structural Stability	10
Section 7 - Assessment, Recommendations/Remedial Measures	11

## APPENDICES

Appendix A - Visual Inspection Check List, Field Sketch, Top of Dam Profile, and Typical Cross-Section
Appendix B - Engineering Data Check List
Appendix C - Photograph Location Plan and Photographs
Appendix D - Hydrologic and Hydraulic Computations
Appendix E - Plates
Appendix F - Regional Geology



PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM  
PURDY DAM  
NDI No. PA 00063, PennDER No. 58-11

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - Purdy Dam is a stone masonry dam. Earthfill was placed between the outside walls and a masonry cap on top. The height of the dam is 7.4 feet and the length is 52 feet. The width at the crest is 3.5 feet with the downstream slope being in a series of terraces and vertical walls. The upstream slope appears to be similar to the downstream slope but is covered with a great deal of debris and silt and could not be observed.

The spillway is located immediately to the right of the center of the dam and consists of a stone broad crested weir and chute. The spillway crest is 11 feet long perpendicular to the direction of flow. The flow from the spillway cascades over several terraces in the spillway and over a vertical drop at the downstream end. The plunge pool is stone-lined.

There are no outlet works for the dam.

- b. Location - Purdy Dam is located on Salt Lick Creek approximately 3.2 miles east-southeast of New Milford in New Milford Township, Susquehanna County, Pennsylvania. The coordinates of the dam are N 41° 51.7' and W 75° 40'. The dam can be found on the Harford, PA USGS 7.5 minute topographic quadrangle.

- c. Size Classification - The height of the dam is 7.4 feet and the reservoir volume is 62 acre-feet at the minimum top of dam [Elevation 1409.6 feet Mean Sea Level (ft. M.S.L.)]. The dam is therefore in the "Small" size category.
- d. Hazard Classification - If the dam were to fail, property damage may occur to one trailer and two homes 10,000 feet downstream from the dam but loss of life is unlikely. There may also be damage to PA Route 492 which passes over the downstream channel 9000 feet downstream from the dam. The dam is therefore classified in the "Significant" hazard category.
- e. Ownership - The dam and reservoir are owned by the Pennsylvania Fish Commission. The person responsible for maintenance and operations of the dam is Mr. Charles Rupert, Area III Maintenance Manager, Box 88, Sweet Valley, Pennsylvania 18656.
- f. Purpose of Dam - The dam was originally constructed for water power, but is now used for fishing.
- g. Design and Construction History - There is no information available on the construction date or company responsible for designing and constructing the dam. The earliest records of the dam in PennDER File No. 58-11 date back to 1920.
- h. Normal Operating Procedures - The reservoir is maintained at the crest of the spillway (Elevation 1409.0 ft. M.S.L.). The dam is visited once a month during the late fall and winter, and approximately every other week or more frequently during the spring, summer, and early fall.

### 1.3 PERTINENT DATA

a. <u>Drainage Area (square miles)</u> -	6.63
b. <u>Discharge at Dam Site (c.f.s.)</u> -	
Maximum Known Flood (1977) -	115
Spillway Capacity at Maximum Pool (El. 1409.6 ft. M.S.L.) -	20
c. <u>Elevation (feet above M.S.L.)*</u> -	
Design Top of Dam -	Unknown
Minimum Top of Dam -	1409.6
Maximum Design Pool -	Unknown

\*All elevations are referenced to the spillway crest, El. 1409.0 ft. M.S.L. as estimated from the USGS 7.5 minute topographic quadrangle, Harford, Pennsylvania.

Spillway Crest -	1409.0
Streambed at Toe of Dam -	1402.2
Maximum Tailwater of Record -	Unknown
d. <u>Reservoir (feet)</u> -	
Length of Maximum Pool	
(El. 1409.6 ft. M.S.L.) -	1825
Length of Normal Pool	
(El. 1409.0 ft. M.S.L.) -	1800
e. <u>Storage (acre-feet)</u> -	
Top of Dam (El. 1409.6 ft. M.S.L.) -	62
Normal Pool (El. 1409.0 ft. M.S.L.) -	54
f. <u>Reservoir Surface (acres)</u> -	
Top of Dam (El. 1409.6 ft. M.S.L.) -	12.70
Normal Pool (El. 1409.0 ft. M.S.L.) -	11.94
g. <u>Dam</u> -	
Type - Stone wall dam with earthfill and masonry cap	
Total Length (feet) -	52
Height (feet) - Design -	Unknown
Field -	7.4
Top Width (feet) -	3.5
Side Slopes - Upstream -	Vertical
Downstream -	Vertical
Zoning -	None
Impervious Core -	None
Cut-off -	Unknown
Drains -	None
h. <u>Diversion and Regulating Tunnels</u> -	
	None
i. <u>Spillway</u> -	
Type - Stone broad crested weir	
Location - Right of center of dam	
Length of Crest Perpendicular to	
Flow (feet) -	11
Crest Elevation (ft. M.S.L.) -	1409.0
Gates -	None
Downstream Channel - Stone-lined plunge pool	
and downstream channel	
j. <u>Outlet Works</u> -	
	None

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

Information reviewed for the preparation of this report included File 58-11 of the Pennsylvania Department of Environmental Resources (PennDER) and the Pennsylvania Fish Commission's file for the dam. These files contained the following information.

- 1) The earliest correspondence regarding this dam consisted of a dam inspection report by the Water Supply Commission of Pennsylvania, dated 22 May 1920.
- 2) The latest dam inspection was conducted on 15 September 1965 by PennDER. They stated that the dam was in good condition except for the accumulation of debris in the spillway and downstream channel.

### 2.2 CONSTRUCTION

It is not known when the dam was constructed or who performed the original design and construction of the dam. The only information available concerning the construction history of the dam was obtained from the PennDER file on the dam. The information indicated that on 12 April 1938, the dam was inspected by the Water and Power Resources Board, at which time it was in ruins. The dam was then rebuilt in 1939 by the Susquehanna County Sportsmen's Association.

### 2.3 OPERATION

Maintenance and operations records are now kept by Mr. Chuck Rupert of the Fish Commission. The spillway is uncontrolled and the reservoir level is normally at the spillway crest. The dam is visited once a month during the late fall and winter, and approximately every other week or more frequently during the spring, summer and early fall.

### 2.4 EVALUATION

- a. Availability - Other than the information contained in PennDER's File No. 58-11 and the Pennsylvania Fish Commission file for this dam, no design or construction data are available.

- b. Adequacy - The information available is generally adequate for a Phase I Inspection.
- c. Validity - There is no indication at the present time to doubt the validity of the available engineering data.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

- a. General - The dam was found to be in fair overall condition at the time of inspection on 27 October 1980. No unusual weather conditions were experienced during the inspection. Noteworthy deficiencies observed during the visual inspection are described briefly in the following paragraphs. The complete visual inspection checklist, field sketch, top of dam profile, and typical cross-section are given in Appendix A.
- b. Dam - An erosion gully was observed at the right downstream abutment of the dam. No other significant problems were observed.
- c. Appurtenant Structures - Some debris and sediment has accumulated in the spillway approach channel.
- d. Reservoir Area - The reservoir slopes are mild to moderate with no signs of instability. Two dams are located upstream of Purdy Dam. Both of these have been inspected by Michael Baker, Jr., Inc. and their Phase I Inspection Reports are currently being prepared. These two dams are Page's Lake Dam (NDI No. PA 00062, PennDER No. 58-5) and Fuller's Lake Dam (NDI No. PA 00073, PennDER No. 58-121).
- e. Downstream Channel - The downstream channel is crossed approximately 1.5 miles downstream by a bridge carrying PA Route 492. One trailer and two homes are located downstream of the dam. They may suffer economic damage if the dam should fail.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

There are no formal written instructions for lowering the reservoir or evacuating the downstream area in case of an impending failure of the dam.

It is recommended that formal emergency procedures be adopted, prominently displayed, and furnished to all operating personnel.

### 4.2 MAINTENANCE OF DAM AND APPURTENANCES

The Pennsylvania Fish Commission is responsible for the maintenance of the dam. Generally, the maintenance procedures followed by their personnel are considered adequate.

The accumulation of debris and sediment should be removed from the approach channel to the spillway.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

There are no operating facilities for the dam. An emergency drawdown plan should be developed in case an emergency drawdown should become necessary.

### 4.4 DESCRIPTION OF ANY WARNING SYSTEM

There is no warning system in the event of a dam failure. An emergency warning system should be developed.

### 4.5 EVALUATION OF OPERATIONAL ADEQUACY

The current operational features are adequate for the purpose they serve. However, it is recommended that a formal maintenance and operations manual be prepared for the dam.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

- a. Design Data - No hydrologic or hydraulic design calculations are available for Purdy Dam.
- b. Experience Data - The maximum flood of record was reported to have occurred during the winter of 1977. At this time the depth of flow in the spillway was reported to have been 1.5 feet. This corresponds to a flow of 115 c.f.s.
- c. Visual Observations - During the visual inspection, no problems were observed which would indicate that the dam and appurtenant facilities could not perform satisfactorily during a flood event.

There is one low spot on the dam crest (Station 1+10) which is only 0.6 feet above the spillway crest.

Page's Lake Dam (NDI No. 00062) is 2050 feet upstream from Purdy Pond. Page's Lake Dam is a 162 feet long, 15 feet high, dry masonry dam with a concrete spillway 40 feet wide by 4.5 feet high.

Fuller's Lake Dam (NDI No. 00073) is 9300 feet upstream from Page's Lake. Fuller's Lake Dam is a 143 feet long, 9 feet high, earthfill dam with a trapezoidal earth spillway.

- d. Overtopping Potential - Purdy Dam is a "Small" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF). Because the dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF.

Using material from "The Hydrologic Study - Tropical Storm Agnes" prepared by the Special Studies Branch, Planning Division, North Atlantic Division, Corps of Engineers, in New York City, December 1975, the peak inflow to the impoundment for the 100-year flood was calculated to be 1595 c.f.s.

The hydraulic characteristics of the basin, specifically, the Snyder's unit hydrograph parameters, were obtained from a regionalized analysis conducted by the Baltimore District of the U.S. Army



Corps of Engineers. Using zero as an initial and constant loss rate, a flow of only 1170 c.f.s. was obtained; therefore, the SCS dimensionless unit hydrograph approach was used to obtain the 100-year flood hydrograph.

The hydraulic capacity of the dam, reservoir, and spillway was then assessed by utilizing the U.S. Army Corps of Engineers' Flood Hydrograph Package, HEC-1 DB. The hydrograph from Fuller's Lake Dam (NDI No. PA 00073) was routed downstream to Page's Lake Dam (NDI No. PA 00062) and combined with the runoff hydrograph for Page's Lake. It was then routed through Page's Lake Dam, downstream to Purdy Dam and combined with the runoff hydrograph for Purdy Pond.

Analyses of the dam and spillway show that Purdy Dam will be overtopped by a maximum depth of 4.32 feet for a total duration of 40.83 hours.

- e. Spillway Adequacy - As outlined in the above analyses, the spillway will not pass the SDF without overtopping the dam; therefore, the spillway is considered "Inadequate."

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - There were no structural inadequacies noted during the visual inspection that cause concern for the structural stability of the dam.
- b. Design and Construction Data - No design or construction data were available for review. Generally, for this type of dam, if the ratio of the width of the stonewall portion of the dam is greater than 0.5 times the height of the dam ( $w/h$ ), then stability of the dam due to overturning or sliding is not a problem. (Reference "Evaluation and Repair of Stonewall-earth Dams," by Kent A. Healy, Proceedings of "Safety of Small Dams," New England College, Henniker, New Hampshire, August 4-9, 1974, pp 149-178). The  $w/h$  ratio for this dam is close to one and no sign of instability was observed during the visual inspection, therefore, further assessments of the structural stability are not considered necessary.
- c. Operating Records - No operating records are available. Nothing in the procedures described by the owner's representative indicates concern for the structural stability of the dam.
- d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed.
- e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity; therefore, further consideration of the seismic stability is not warranted.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT

- a. Safety - Purdy Dam was found to be in fair overall condition at the time of inspection. Purdy Dam is a "Significant" hazard - "Small" size dam requiring a spillway capacity in the range of the 100-year flood to the 1/2 PMF. Because Purdy Dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF. As presented in Section 5, the spillway and reservoir are not capable of passing the 100-year flood without overtopping the dam. During the 100-year flood, the dam is overtopped by a maximum depth of 4.32 feet for a total duration of 40.83 hours. Therefore, the spillway is considered "Inadequate."
- b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.
- c. Urgency - The owner should immediately initiate the further evaluation discussed in paragraph 7.1.d.
- d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

### 7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. Item 1 below should be completed by a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

- 1) Initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

- 2) Fill the erosion gully at the right downstream abutment of the dam and reseed the area.
- 3) Remove the debris and silt at the entrance to the spillway.
- 4) Provide means to draw down reservoir during an emergency.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH,  
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List  
Visual Inspection  
Phase 1

Name of Dam Purdy (Stump Pond) Dam County Susquehanna State PA Coordinates Lat. N 41°51.7'

NDI # PA 00063  
PennDER # 58-11

Long. W 75°40'

Date of Inspection 27 October 1980

Weather Partly Cloudy

Temperature 40° F.

Pool Elevation at Time of Inspection 1409.0 ft.\* M.S.L.

Tailwater at Time of Inspection 1405.6 ft.\* M.S.L.

\*Assumed elevation from U.S.G.S. 7.5 minute topographic quadrangle, Harford, Pennsylvania.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski  
Wayne D. Lasch  
Jeffrey S. Maze

Owner's Representatives:

Mr. E. Grindall  
Charles J. Rupert  
Pennsylvania Fish Commission,  
Division of Fisheries and  
Engineering

James G. Ulinski Recorder

MASONRY DAMS

Name of Dam: PURDY DAM  
 NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE	None observed	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Slight erosion along right downstream abutment.	Fill in gully and seed area.
DRAINS	None observed	
WATER PASSAGES	None observed	
FOUNDATION	No problems observed	

## MASONRY DAMS

Name of Dam: PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES		None observed	

## STRUCTURAL CRACKING

None observed

VERTICAL AND HORIZONTAL  
ALIGNMENT

No problems observed

## MONOLITH JOINTS

Not Applicable

## CONSTRUCTION JOINTS

Not Applicable



EMBANKMENT - Not Applicable

Name of Dam PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS		

UNUSUAL MOVEMENT OR  
CRACKING AT OR BEYOND  
THE TOE

SLOUGHING OR EROSION OF  
EMBANKMENT AND ABUTMENT  
SLOPES

EMBANKMENT - Not Applicable

Name of Dam PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

VERTICAL AND HORIZONTAL  
ALIGNMENT OF THE CREST

RIPRAP FAILURES

EMBANKMENT - Not Applicable

Name of Dam PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
ANY NOTICEABLE SEEPAGE		
STAFF GAGE AND RECORDER		
DRAINS		

OUTLET WORKS - Not Applicable

Name of Dam: PURDY DAM  
 NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
<p>CRACKING AND SPALLING OF                      CONCRETE SURFACES IN                      OUTLET CONDUIT</p>		
<p>INTAKE STRUCTURE</p>		
<p>OUTLET STRUCTURE</p>		
<p>OUTLET CHANNEL</p>		
<p>EMERGENCY GATE</p>		

UNGATED SPILLWAY

Name of Dam: PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Not Applicable	
APPROACH CHANNEL	Accumulation of debris and sediment.	Remove debris and sediment.
DISCHARGE CHANNEL	Good condition.	
BRIDGE AND PIERS	None observed	

GATED SPILLWAY - Not Applicable

Name of Dam: PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION  
EQUIPMENT

INSTRUMENTATION

Name of Dam: PURDY DAM

NDI # PA 00063

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
--------------------	--------------	----------------------------

MONUMENTATION/SURVEYS	None observed	
-----------------------	---------------	--

OBSERVATION WELLS	None observed	
-------------------	---------------	--

WEIRS	None observed	
-------	---------------	--

PIEZOMETERS	None observed	
-------------	---------------	--

OTHER		
-------	--	--

## RESERVOIR

Name of Dam: PURDY DAM

NDI # PA 00063

## VISUAL EXAMINATION OF

## OBSERVATIONS

## REMARKS OR RECOMMENDATIONS

## SLOPES

The reservoir slopes are gentle to moderate with no signs of instability. PA Route 492 is on the right reservoir shoreline.

## SEDIMENTATION

The upper fifth of the reservoir is silted in. This sedimentation problem should not significantly affect the performance of the dam and reservoir during flood events.

## UPSTREAM DAMS

- 1) Page's Lake Dam (NDI # PA 00062, PennDER # 58-5) is upstream of Purdy Dam. A Phase I Inspection Report is being prepared by Michael Baker, Jr., Inc. currently with this inspection report.
- 2) Fuller's Lake Dam (NDI # PA 00073, PennDER # 58-121) is located upstream of both Purdy Dam and Page's Lake Dam. A Phase I Inspection Report for this dam is also in the process of preparation.



## DOWNSTREAM CHANNEL

Name of Dam: PURDY DAM

NDI # PA 00063

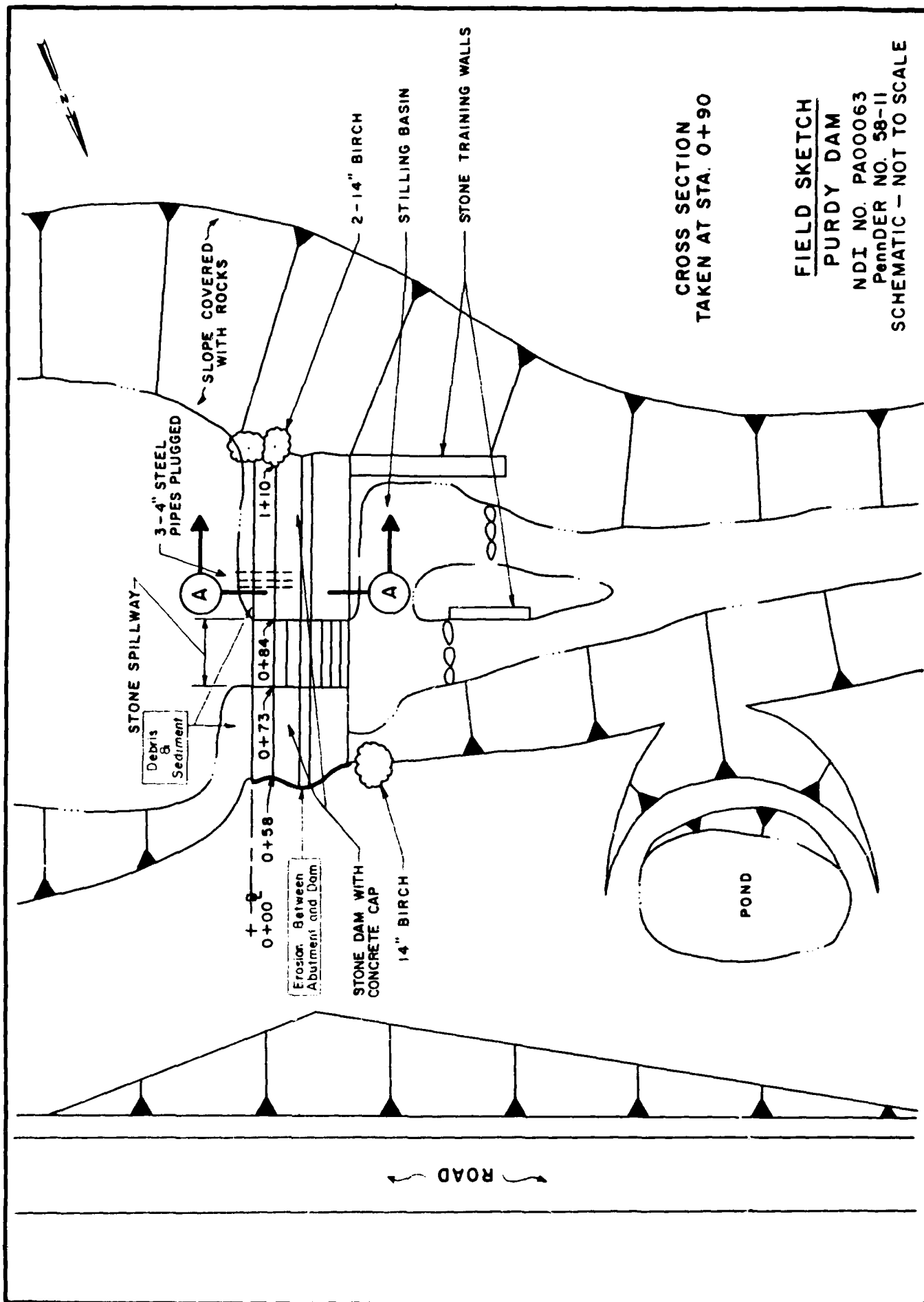
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Some vegetation is present in the downstream channel but no debris or blockages are present.	

## SLOPES

The downstream channel slope is moderate. The side slopes are well-vegetated and no problems were observed.

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

A bridge carrying PA Route 492 over the channel is located downstream. This bridge has an opening 13 ft. wide by 5 ft. high. One trailer and 2 homes are located downstream of this bridge.



MICHAEL BAKER, JR., INC.

PURDY (STUMP POND) DAM

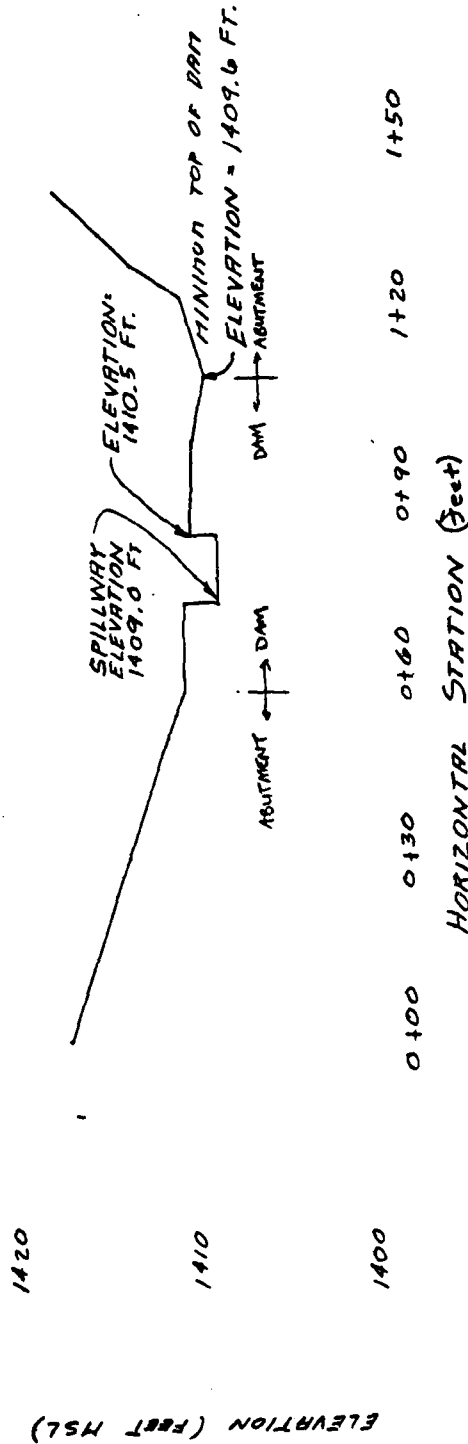
THE BAKER ENGINEERS

TOP OF DAM PROFILE  
TYPICAL CROSS-SECTION

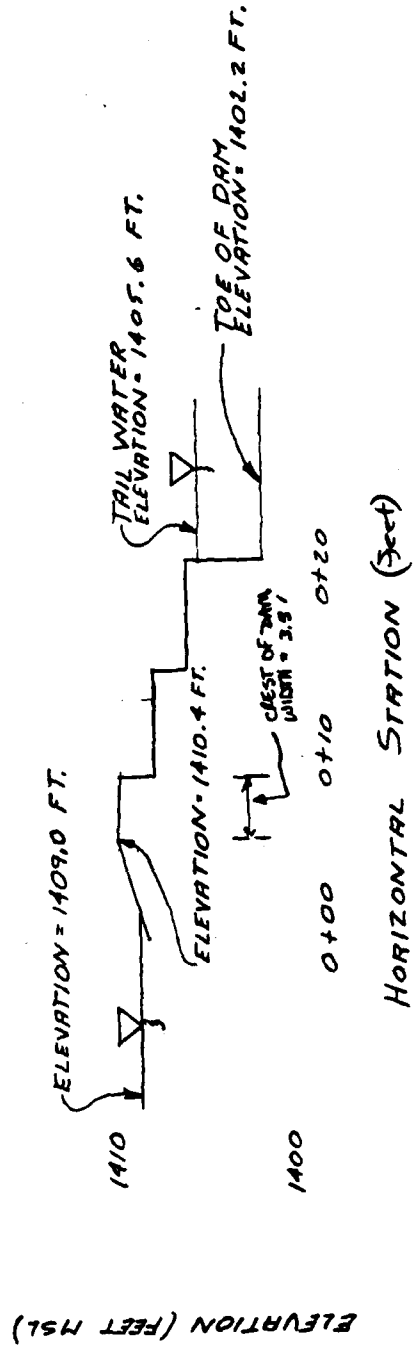
Box 280  
Beaver, Pa. 15009

DATE OF INSPECTION: 27 October 1980

TOP OF DAM PROFILE (LOOKING UPSTREAM)



TYPICAL CROSS SECTION



APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: PURDY DAMNDI # PA 00063

ITEM	REMARKS
PLAN OF DAM	None available
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle, Harford, Pennsylvania, was used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1).
CONSTRUCTION HISTORY	No dates or construction history is known.
TYPICAL SECTIONS OF DAM	No information available
HYDROLOGIC/HYDRAULIC DATA	No information available
OUTLETS - PLAN	No information available
- DETAILS	No information available
- CONSTRAINTS	No information available
- DISCHARGE RATINGS	No information available
RAINFALL/RESERVOIR RECORDS	None available

Name of Dam: PURDY DAM

NDI # PA 00063

YTEH

REMARKS

No information available

DESIGN REPORTS

No information available. The regional geology is presented as Appendix F of this report.

GEOLOGY REPORTS

No information available

DESIGN COMPUTATIONS  
HYDROLOGY & HYDRAULICS  
DAM STABILITY  
SEEPAGE STUDIES

No information available

MATERIALS INVESTIGATIONS  
BORING RECORDS  
LABORATORY  
FIELD

None

POST-CONSTRUCTION SURVEYS OF DAM

No information available

BORROW SOURCES

Name of Dam: PURDY DAM  
 NDI # PA 00063

ITEM	REMARKS
------	---------

**MONITORING SYSTEMS**

None

**MODIFICATIONS**

Dam was reconstructed in 1939 by the Susquehanna Sportsmen's Association

**HIGH POOL RECORDS**

No information available

**POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS**

No detailed engineering report other than the 22 May 1920 Water Supply Commission Inspection is available. A number of inspection reports are available in the PennDER file, including the latest recorded inspection on 15 October 1965 by PennDER.

**PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS**

None reported in the information available.

**MAINTENANCE OPERATION RECORDS**

Formal records of maintenance are kept by the Pennsylvania Fish Commission.

Name of Dam: PURDY DAM

NDI # PA 00063

ITEM	REMARKS
------	---------

SPILLWAY PLAN,	No information available
----------------	--------------------------

SECTIONS,  
and  
DETAILS

OPERATING EQUIPMENT PLANS & DETAILS	No information available
--	--------------------------



CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 6.63 sq.mi., mild to steep slopes  
with wooded areas.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1409.0 ft.  
(54 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1409.6 ft.  
(62 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1409.6 ft. (minimum crest elevation)

SPILLWAY: \_\_\_\_\_

- a. Crest Elevation 1409.0 ft.
- b. Type Broad crested masonry weir
- c. Width of Crest Parallel to Flow 3.5 ft.
- d. Length of Crest Perpendicular to Flow 11 ft.
- e. Location Spillover Center of dam
- f. Number and Type of Gates None

OUTLET WORKS: None

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Entrance Inverts \_\_\_\_\_
- d. Exit Inverts \_\_\_\_\_
- e. Emergency Drawdown Facilities \_\_\_\_\_

HYDROMETEOROLOGICAL GAGES: None

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE 115 c.f.s.

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

## DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam

Photograph Location Plan

Photo 1 - View of Upstream Side of Dam from Right Shoreline

Photo 2 - View of Upstream Side of Dam from Left Shoreline

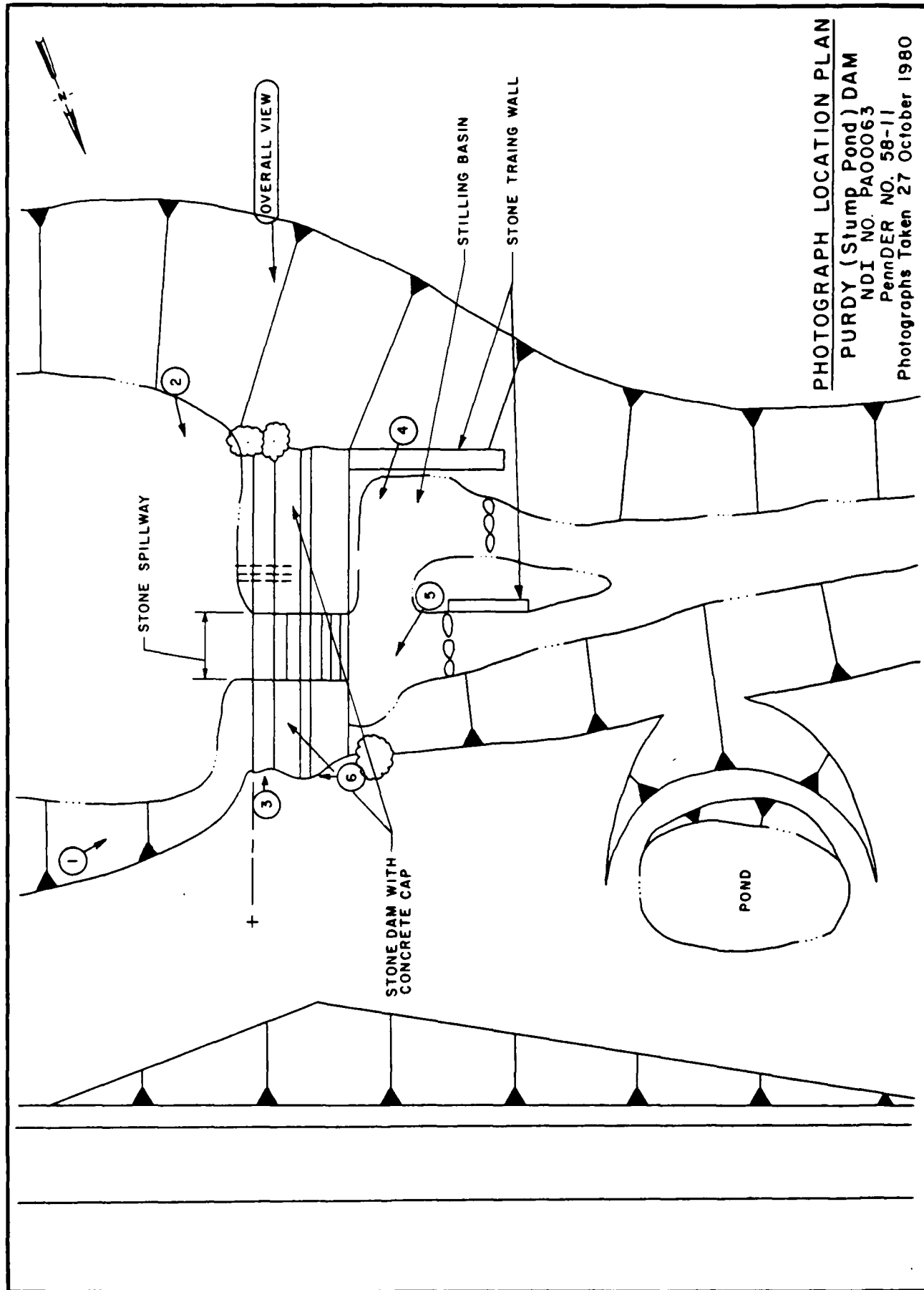
Photo 3 - View Across Crest of Dam from Right Abutment

Photo 4 - View of Downstream Side of Dam from Left Abutment

Photo 5 - View of Right Abutment

Photo 6 - Eroded Area of Right Abutment

Note: Photographs were taken on 27 October 1980.



# **PHOTOGRAPH LOCATION PLAN**

**PURDY (Stump Pond) DAM**

NDI NO. PA00063

PennDER NO. 58-11

Photographs Taken 27 October 1980

# **PURDY (STUMP POND) DAM**



**PHOTO 1. View of Upstream Side of Dam from Right Shoreline**



**PHOTO 2. View of Upstream Side of Dam from Left Shoreline**

# PURDY (STUMP POND) DAM

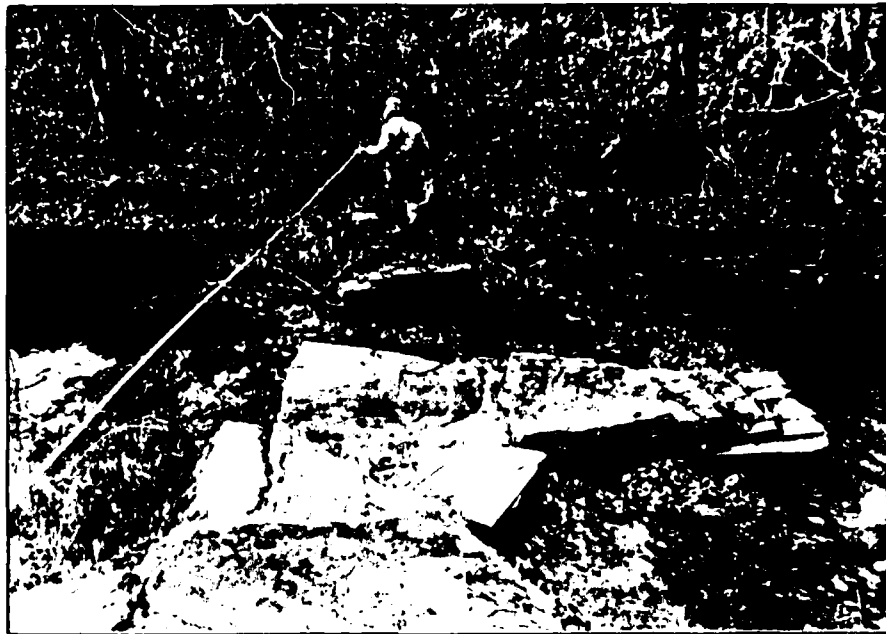
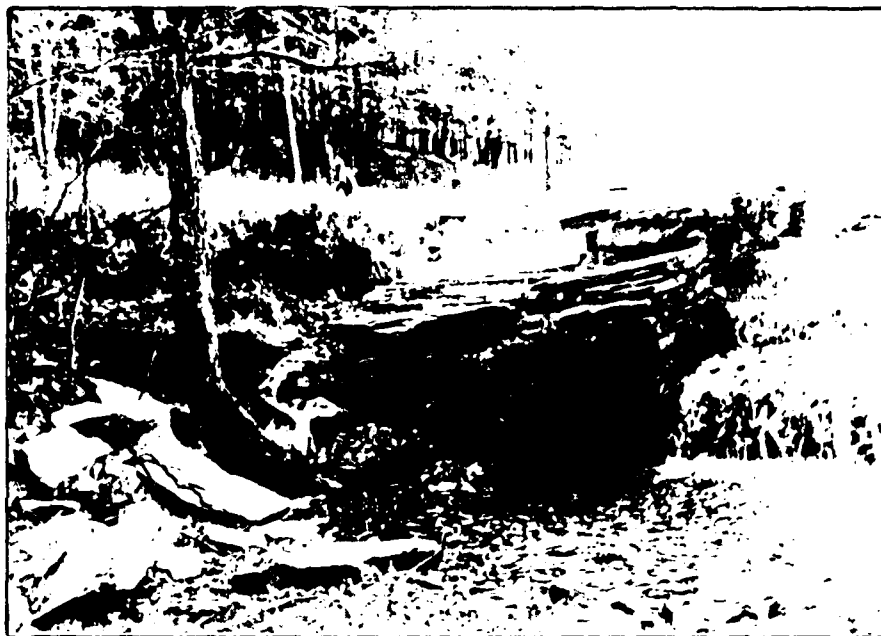


PHOTO 3. View Across Crest of Dam from Right Abutment



PHOTO 4. View of Downstream Side of Dam from Left Abutment

**PURDY (STUMP POND) DAM**



**PHOTO 5. View of Right Abutment**



**PHOTO 6. Eroded Area of Right Abutment**

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject PURDY DAM

S.O. No. \_\_\_\_\_

APPENDIX D - HYDROLOGIC AND

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

HYDRAULIC COMPUTATIONS

Drawing No. \_\_\_\_\_

Computed by \_\_\_\_\_ Checked by \_\_\_\_\_ Date \_\_\_\_\_

<u>SUBJECT</u>	<u>PAGE</u>
PREFACE	i
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
TOP OF DAM PROFILE AND CROSS SECTION	4
SPILLWAY DISCHARGE RATING	5
100-YEAR STORM DISTRIBUTION	6
100-YEAR DISCHARGE CALCULATION	7
ROUTING SUMMARY	10
HEC-1 CAPACITY ANALYSIS	11

## PREFACE

### HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

# HYDROLOGY AND HYDRAULIC ANALYSIS LAKES DAM

DASH OF LAKES FULLER'S LAKES

100-YEAR STORM = 4.11 INCHES PER HOUR

STATION	1	2	3	4
Station Description	FULLER'S LAKE DAM NII # FA 00073	PAGE'S LAKE DAM NII # FA 00061	PURDY DAM NII # FA 00064	
Drainage Area (square miles)	0.95	1.85	1.85	
Cumulative Drainage Area (square miles)	0.95	4.76	6.63	
Adjustment of PMF for Drainage Area (%) <sup>(1)</sup>				
6 hours	100-YEAR STORM	100-YEAR STORM	100-YEAR STORM	
12 hours	DISTRIBUTION	DISTRIBUTION	DISTRIBUTION	
24 hours	ON SHEET 6	ON SHEET 6	ON SHEET 6	
48 hours				
72 hours				
SCS Dimensionless Unit Hydrograph Parameters				
	$T_c = 1.36$ hr.	$T_c = 2.07$ hr.	$T_c = 1.32$ hr.	
	Lag Time = .82 hr.	Lag Time = 1.24 hr.	Lag Time = 0.79 hr.	
	CN = 70	CN = 64	CN = 71	
Spillway Data				
Crest Length (ft)	TRAPEZOIDAL SPILLWAY	SPILLWAY RATING	SPILLWAY	
Freeboard (ft)	RATING CURVE TAKEN	CURVE TAKEN	RATING CURVE	
Discharge Coefficient	FROM FULLER'S LAKE	FROM PAGE'S	DEVELOPED ON	
Slope	DAM INSPECTION REPORT	LAKE DAM INSPEC- TION REPORT	SHEET 5	

(1) Technical Paper No. 40, Cooperative Studies Section, U.S. Weather Bureau, Washington, D.C., 1961.

By: J. D. B.  
Title: Chief Engineer

Checked by:

11/11

Checked by:

11/11

### ESTIMATED FLOOD FLOW

1. FLOOD FLOW AT DAM - 12,000 CFS (12,000 GPM)

2. FLOOD FLOW AT 1/4 MILE ABOVE DAM - 12,000 CFS

12,000	94
12,000	12.50
12,000	12.50

### ESTIMATED FLOOD FLOW

1. FLOOD FLOW AT DAM - 12,000 CFS (12,000 GPM)

- 2. ESTIMATED FLOOD FLOW AT 1/4 MILE ABOVE DAM - 12,000 CFS
- 3. ESTIMATED FLOOD FLOW AT 1/2 MILE ABOVE DAM - 12,000 CFS
- 4. ESTIMATED FLOOD FLOW AT 3/4 MILE ABOVE DAM - 12,000 CFS
- 5. ESTIMATED FLOOD FLOW AT 1 MILE ABOVE DAM - 12,000 CFS

$$Q = 12,000 \text{ CFS} \times \left( \frac{1.94}{1.94 + 1.0} \right) = 12,000 \text{ CFS} \times 0.66 = 7,920 \text{ CFS}$$

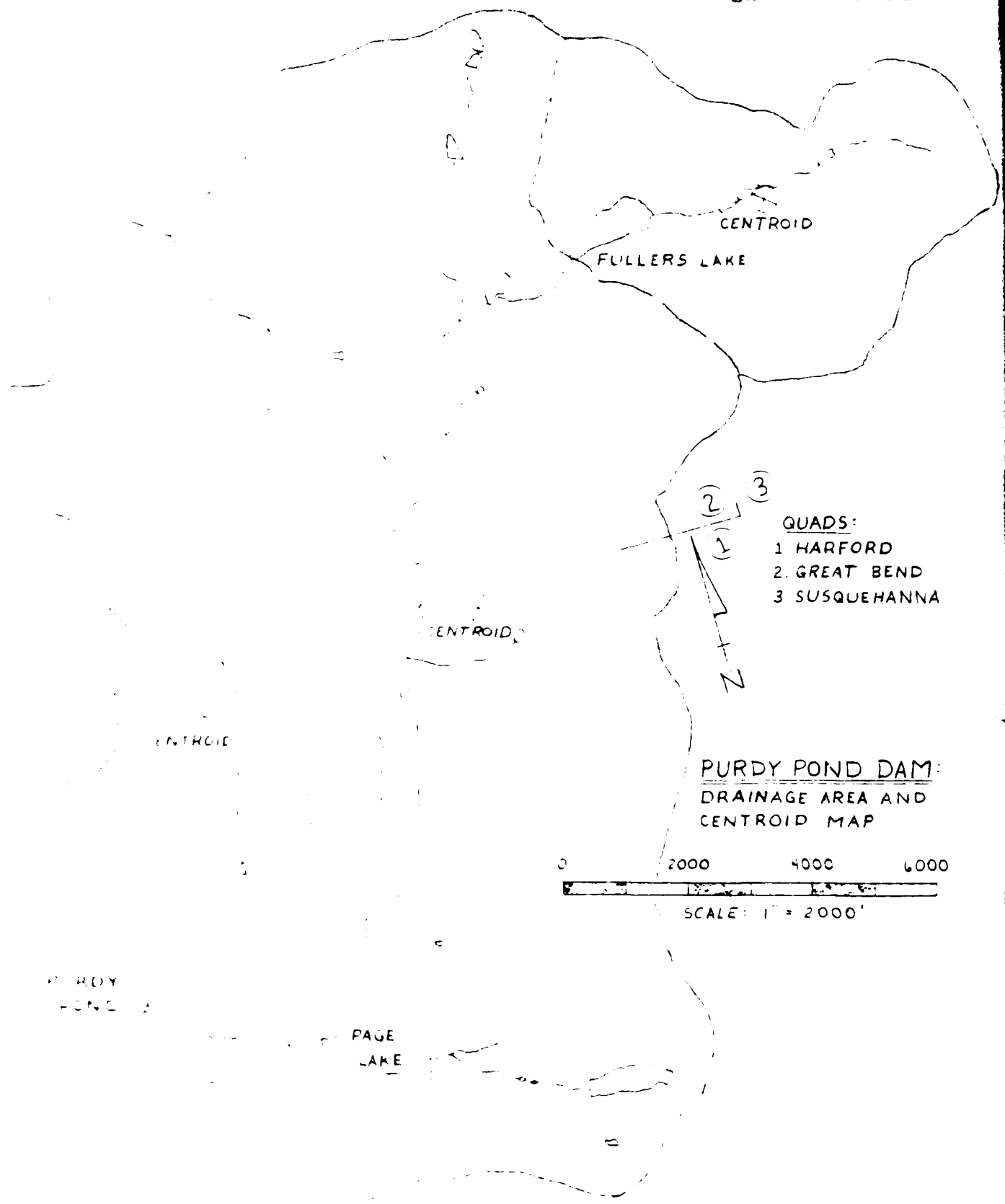
### THE DAM STORAGE

12,000 CFS (FROM HEC - 4, 2, 1, 5, 5)

### SNOWDROPS UNIT HYDROGRAPH PARAMETERS

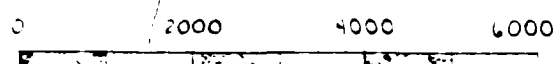
$L = 2.99 \text{ HRS}$ ,  $L_{ca} = 1.36 \text{ HRS}$   
WATERSHED IS IN ZONE 1 A  
 $C_p = 1.50$ ,  $C_p = 0.62$   
 $T_p = 1.50 (L + L_{ca})^{0.7} = 2.20$

DRAINAGE AREA ABOVE DAM - 6.63 SQ. MI.



- QUADS:
- 1 HARFORD
  - 2 GREAT BEND
  - 3 SUSQUEHANNA

PURDY POND DAM:  
DRAINAGE AREA AND  
CENTROID MAP



SCALE: 1" = 2000'

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject PURDY DAM

S.O. No. 13837-00-ARA-04

TOP OF DAM PROFILE

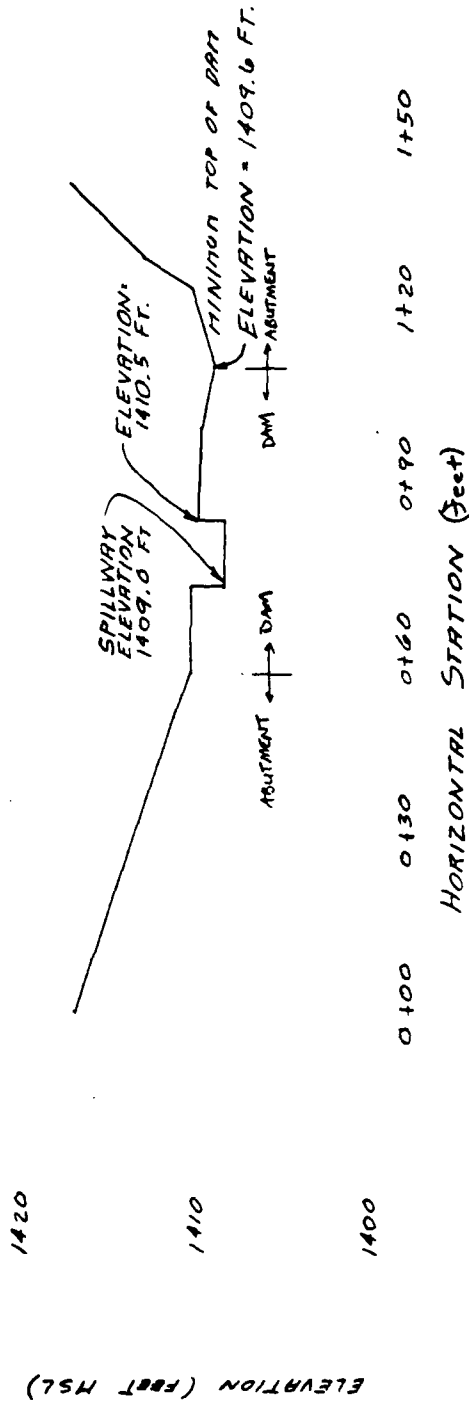
Sheet No. 4 of 23

TYPICAL CROSS SECTION

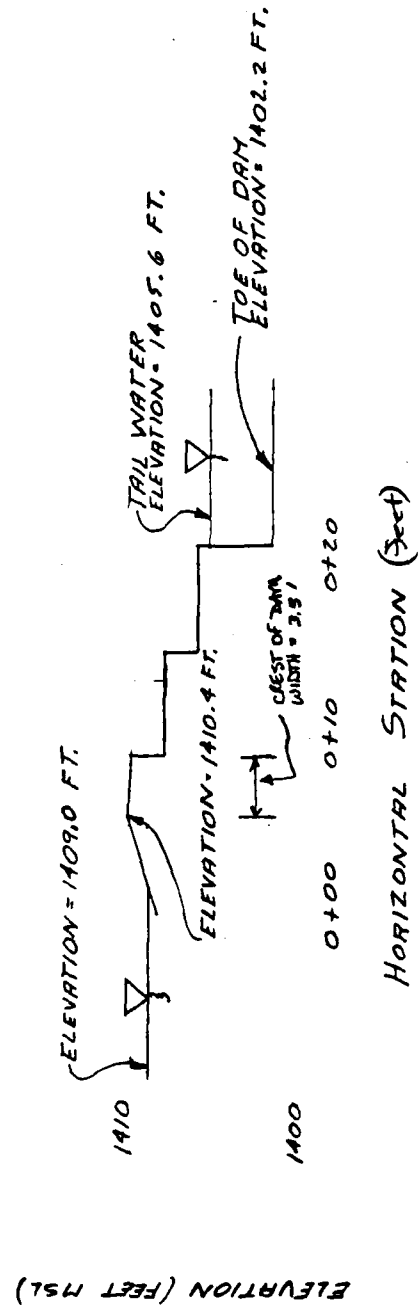
Drawing No. \_\_\_\_\_

Computed by GWT Checked by WDL Date 11-17-80

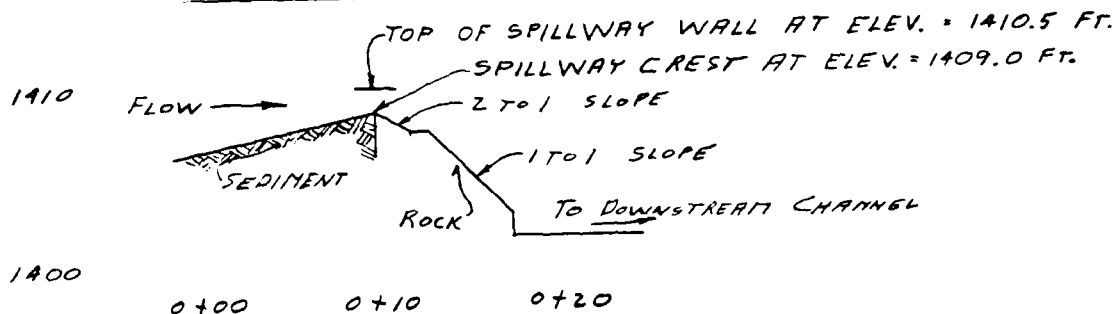
TOP OF DAM PROFILE (LOOKING UPSTREAM)



TYPICAL CROSS SECTION



SPILLWAY PROFILE



DEVELOP RATING CURVE BASED UPON CRITICAL FLOW OVER SPILLWAY:

$$V = \sqrt{gD} \quad (\text{CHOW, OPEN CHANNEL HYDRAULICS, P. 43})$$

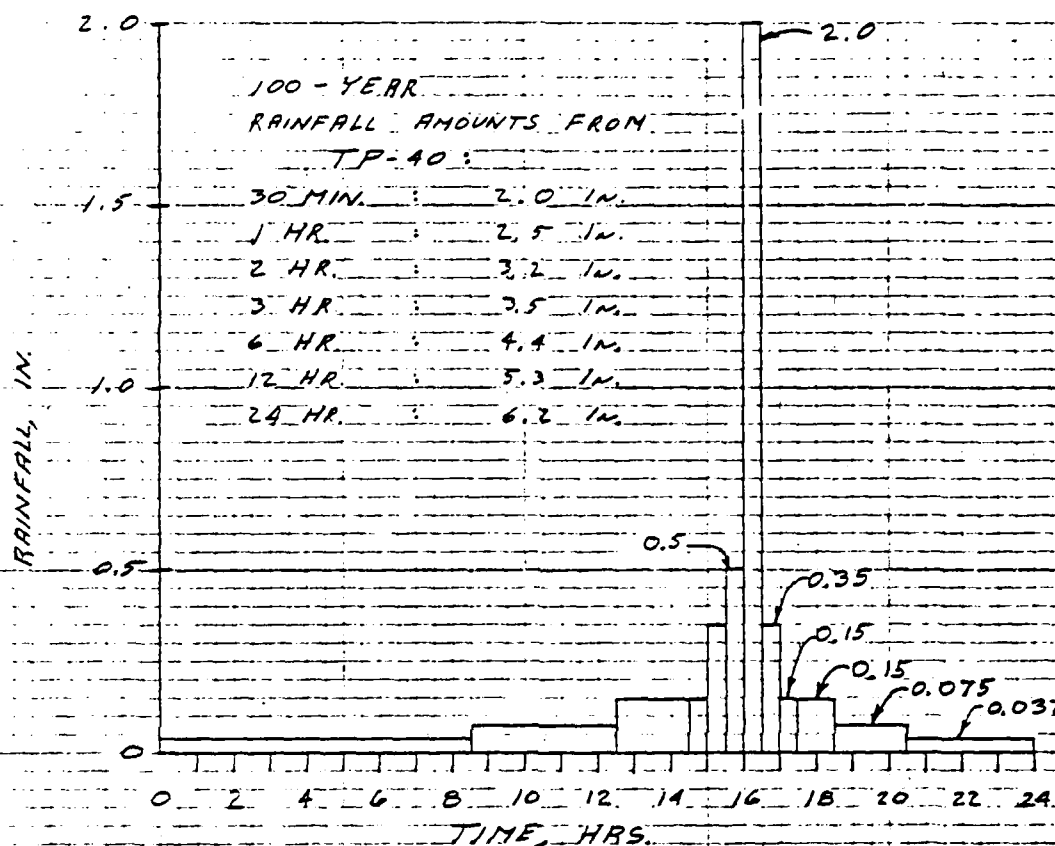
$$g = 32.2 \text{ FT/SEC.}^2$$

$$D = \text{MEAN HYDRAULIC DEPTH} = \frac{\text{FLOW AREA}}{\text{FREE SURFACE TOP WIDTH}} = \frac{A}{T}$$

$$V = \text{MEAN FLOW VELOCITY}$$

$$Q = RV$$

ELEV., FT.	FLOW DEPTH, FT.	AREA, FT. <sup>2</sup>	TOPWIDTH, FT.	$\frac{A}{T}$	$V, \frac{\text{FT.}}{\text{SEC.}}$	Q, CFS	$\frac{V^3}{2g}$	EGL, FT.
1409.0	0	0	0	0	0	0	0	1409.0
1409.5	0.5	5.5	11	.5	4.01	22.06	0.25	1409.75
1410.0	1.0	11.0	11	1.0	5.67	62.37	0.50	1410.50
1410.5	1.5	16.5	11	1.5	6.95	114.67	0.75	1411.25
1411.0	2.0	22.0	11	2.0	8.03	176.66	1.00	1412.00
1411.5	2.5	27.5	11	2.5	8.97	246.67	1.25	1412.75
1412.0	3.0	33.0	11	3.0	9.83	324.34	1.50	1413.50
1412.0	4.0	44.0	11	4.0	11.35	499.40	2.00	1415.00
1414.0	5.0	55.0	11	5.0	12.69	697.87	2.50	1416.50



RAINFALL DISTRIBUTION  
(30 MINUTE INTERVALS)

INTERVAL NUMBERS	% TOTAL RF OCCURRING IN EACH INTERVAL
1 - 17	0.6
18 - 25	1.2
26 - 29	2.4
30	2.5
31	5.7
32	8.1
33	12.3
34	5.7
35	2.5
36 - 37	2.4
38 - 41	1.2
42 - 48	0.6
TOTAL = 100%	



THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY-TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY.

DRAINAGE AREA - 1.85 SQ. MI.

① COMPUTE THE MEAN LOGARITHM

$$\text{LOG}(Q_m) = C_m + 0.75 \text{ LOG } A$$

$\text{LOG}(Q_m)$  = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS

$A$  = DRAINAGE AREA, SQ. MI., = 1.85 SQ. MI.

$C_m$  = MAP COEFFICIENT FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 = 2.16

$$\begin{aligned} \text{LOG}(Q_m) &= 2.16 + 0.75(\text{LOG } 1.85) \\ &= 2.360 \end{aligned}$$

② COMPUTE STANDARD DEVIATION

$$S = C_s - 0.05(\text{LOG } A)$$

$S$  = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS.

$C_s$  = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = 0.35

$A$  = DRAINAGE AREA, SQ. MI. = 1.85 SQ. MI.

$$\begin{aligned} S &= C_s - 0.05(\text{LOG } A) \\ &= 0.35 - 0.05(\text{LOG } 1.85) \\ &= 0.337 \end{aligned}$$

③ SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.23

$$\text{LOG}(Q_{100}) = \text{LOG}(Q_m) + K(P, g) S$$

$K(P, g)$  = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTAGE ( $P$ ) AND SKEW COEFFICIENT ( $g$ ) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY"

$$\begin{aligned} \text{LOG}(Q_{100}) &= \text{LOG}(Q_m) + K(P, g) S \\ &= 2.360 + 2.501(0.337) \end{aligned}$$

$$\underline{Q_{100} = 1,595 \text{ CFS}}$$

USING ZERO LOSS RATES, A PEAK FLOW OF 1170 CFS WAS OBTAINED IN THE HEC-1 ANALYSIS IF THE SNYDERS UNIT HYDROGRAPH PARAMETERS ORIGINALLY DERIVED FOR THIS BASIN WERE USED.

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009Subject PURDY DAM100-YEAR DISCHARGECALCULATIONS (CONTINUED)Computed by GWTChecked by WDL

S.O. No. \_\_\_\_\_

Sheet No. 8 of 23

Drawing No. \_\_\_\_\_

Date 12-1-80

THE 100-YEAR HYDROGRAPH IS THEREFORE COMPUTED USING THE SCS DIMENSIONLESS UNIT HYDROGRAPH APPROACH. TIME OF CONCENTRATION AND LAG TIME ARE COMPUTED AS FOLLOWS:

$T_c$  = TIME OF CONCENTRATION = OVERLAND FLOW TIME + CHANNEL FLOW TIME

OVERLAND FLOW TIME :

DISTANCE = 4950 FT.

SLOPE =  $\frac{1802 - 1420}{4950} = 7.7 \%$

AVERAGE FLOW VELOCITY = 0.70 FT./SEC.

(FROM FIG. 3.1, T.R. NO. 55, URBAN HYDROLOGY FOR SMALL WATERSHEDS, SCS.)

TRAVEL TIME = 7071 SEC.

CHANNEL FLOW TIME

DISTANCE = 2050 FT.

SLOPE =  $\frac{1720 - 1410}{2050} = 0.49 \%$

ASSUME AVERAGE CHANNEL SIZE IS :



$n = 0.045$

AVERAGE FLOW VELOCITY =  $V = \frac{1.49}{n} R^{2/3} S^{1/2}$

$$V = \frac{1.49}{0.045} \left( \frac{(3+3)3}{3+6\sqrt{1+9}} \right)^{2/3} (0.0049)^{1/2}$$

$V = 2.03$  FT/SEC.

TRAVEL TIME = 1010 SEC.

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

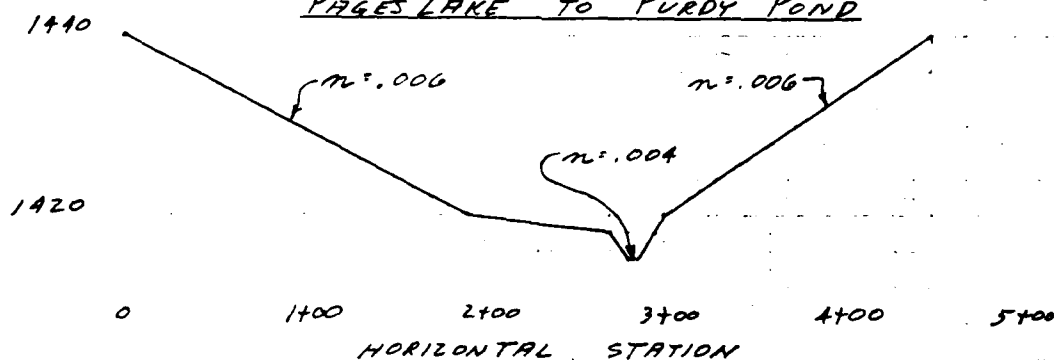
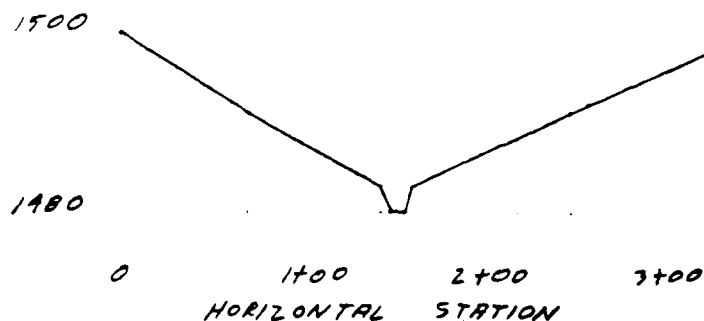
Subject PURDY DAM S.O. No. \_\_\_\_\_  
100-YEAR DISCHARGE Sheet No. 9 of 23  
CALCULATIONS (CONTINUED) Drawing No. \_\_\_\_\_  
Computed by GWT Checked by WDL Date 12-1-80

$$\text{TOTAL TRAVEL TIME} = T_c = 7071 + 1010 = 8081 \text{ SEC.} \\ = 2.24 \text{ HR.}$$

$$\text{LAG TIME} = 0.6 T_c = 1.35 \text{ HR.}$$

WITH THE SCS PROCEDURE, A CURVE NUMBER OF 60 PRODUCED A PEAK FLOW OF 1580 CFS THIS VALUE IS WITHIN 1% OF THE PREVIOUSLY COMPUTED PEAK FLOW OF 1595.3 CFS AND IS WITHIN THE 10% LIMIT SUGGESTED BY THE CORPS GUIDELINES.

NAME	LENGTH OF DAM	HEIGHT OF DAM	NORMAL POOL STORAGE	TOP OF DAM STORAGE	ROUTING LENGTH OF CHANNEL
PURDY POND	52 FT.	7.4 FT.	54.2 AC.-FT. 1409.0 FT.	62 AC.-FT. 1409.6 FT.	
PAGE LAKE	162 FT.	15 FT.	971.1 AC.-FT. 1433.0 FT.	1431 AC.-FT. 1436.2 FT.	2050 FT.
FULLER LAKE	143 FT.	9 FT.	60.7 AC.-FT. 1537.0 FT.	114 AC.-FT. 1539.6 FT.	9300 FT.

TYPICAL ROUTING CHANNELSPAGE'S LAKE TO PURDY PONDFULLER'S LAKE TO PAGE'S LAKE





PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
RUNOFF HYDROGRAPH AT	4
COMBINE 2 HYDROGRAPHS AT	5
ROUTE HYDROGRAPH TO	6
ROUTE HYDROGRAPH TO	7
RUNOFF HYDROGRAPH AT	8
COMBINE 2 HYDROGRAPHS AT	9
ROUTE HYDROGRAPH TO	10
END OF NETWORK	

\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (FHC-1)  
 DAY SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 ABJ UPDATE 04 JUL 79  
 \*\*\*\*\*

RUN DATE 02/17/81  
 TIME 15:54

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF PUNDY DAM  
 UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION

NJ	NIR	NRIN	TDAY	1HR	ININ	NETRC	IPET	IPRT	INSTAN
400	3	10	0	0	0	0	0	-4	0
		JOPER	MNT	LROPT	TKAGE				
		5	0	0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRITU= 1 LRTIU= 1

RTIJS= 1.00

SUB-AREA RUNOFF COMPUTATION

RJWIFF HYDROGRAPH TO DAM

1	1STAQ	1CUMP	1ECON	1TAPE	1JPLT	1JPRT	1INAME	1STAGE	1AUTU
1	0	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

1HYDG	1JHG	1AREA	1SNAP	1TRSDA	1TKSPC	1KATIU	1SHUM	1ISAME	1LUCAL
0	2	0.95	0.0	0.95	0.0	0.0	0	0	0

LUSS DATA

1LROPT	1STARR	1ULTR	1RTIOL	1ERAIN	1SIRKS	1RTIJK	1SIRTL	1UNSTL	1ALSNM	1KLIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	-1.00	-70.00	0.0	0.0

CURVE AJ = -70.00 WETNESS = -1.00 EFFECT CN = 70.00

UNIT HYDROGRAPH DATA

TC= 0.0 LAG= 0.82

RECESSION DATA

STRTO= -1.50 JRCSEN= -0.05 RTIJK= 2.00

END-OF-PERIOD FLOW

40.0A	MR-MN	PERIOD	RAIN	EXCS	LUSS	COMP	CU	MR-MN	PERIOD	RAIN	EXCS	LUSS	LUMP	U
0														

SUM 0.00 2.90 3.24 11.24  
 1 157.11 75.11 82.11 320.321



\*\*\*\*\*

# HYDROGRAPH ROUTING

## ROUTING FOR FULLERS LAKE DAM

ISTAG	ICUMP	IECUN	ITAPE	JPLI	JPRI	INAME	ISAGE	IAUTU
2	1	0	0	0	0	1	0	0
ROUTING DATA								
JLOSS	AVG	IRIS	ISAME	IUPT	IPMP	LSRK		
0.0	0.0	1	1	0	0	0		
DAM DATA								
4STPS	MSIDL	LAG	AMSKK	X	TSK	STOKA	ISPRAT	
1	0	0	0.0	0.0	0.0	-1537.	-1	
STAGE	1537.00	1538.30	1539.00	1539.00	1540.20	1540.30		
FLOW	0.0	29.30	100.30	225.70	370.80	635.80	875.10	
SURFACE AREA=	14.	17.	26.	39.				
CAPACITY=	0.	61.	124.	762.				
ELEVATION=	1533.	1537.	1540.	1560.				
DAM DATA								
COUL	SPMLD	CUJM	EXPM	ELEV	COUL	CAREA	EXPL	
1537.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TOPEL	COUL	EXPM	DAMWID					
1539.6	3.1	1.5	99.					
CREST LENGTH	0.	16.	29.	45.	54.	71.	85.	97.
AT OR BELOW								
ELEVATION	1539.6	1540.0	1540.5	1541.0	1541.5	1542.0	1542.5	1543.0
PEAK OUTFLOW IS	631.	AT TIME	7.00 HOURS					

\*\*\*\*\*

# HYDROGRAPH ROUTING

## ROUTING THRU CHANNEL TO PAGE LAKE

ISTAG	ICOMP	IECUN	ITAPE	JPLI	JPRI	INAME	ISTAGE	IAUTU
3	1	0	0	0	0	1	0	0
ROUTING DATA								
JLOSS	AVG	IRIS	ISAME	IUPT	IPMP	LSTR		
0.0	0.0	1	1	0	0	0		
DAM DATA								
4STPS	MSIDL	LAG	AMSKR	X	TSK	STOKR	ISPRAT	
1	0	0	0.0	0.0	0.0	0.	0	

SHEET

## MINIMAL DEPTH CHANNEL ROUTING

JNELL QN121 QN131 EL101 EL14X SEL  
0.000 0.000 0.000 1500.0 9300. 0.01000

150.00 1480.00 151.00 1480.00

MAXIMUM STAGE IS 1484.3

## SUB-AREA RUNOFF COMPUTATION

**RJ10FF HYDROGRAPH TU PAGE LAKE**

HYDROGRAPH DATA											
IHDG	LHGS	TAREA	SNAP	TRSDA	IRSPC	RATU	JPLI	JPRF	ISAME	ISAGE	ISAUO
0	2	1-83	0-0	3-83	0-0	0-0	0	0	1	0	0

## HYDROGRAPH DATA

CRUPT	STGR	DLGR	RYTOL	ERAIN	SRKS	RTDK	STRIC	CNSIL	ALSHK	WTIMP
LUSS DATA										

CURVE TJ = -84.00 WEINISS = -1.00 EFFECT CH = 84.00

# UNIF HYDROGRAPH DATA

$TC = 0.0$        $LAG = 1.23$

## RECESSION JATA

RECESSION DATA  
GRCSN= -0.05 RTUR= 2.00

ENU-UT-PERIOD FLOW

MO.DA	HR.MI	PERIOD	RAIN		EXCS		LOSS		END-OF-PERIOD FLOW	
			PERIOD	RAIN	EXCS	LOSS	COMP Q	LOSS	COMP Q	
SUN	6.00	7.51	3.79	37056.						
( 1980)	01.01	98.01	1099.510							

CUMULATIVE HYDROGRAPH

### COLLECTING HYDROGRAPHS FROM STATIONS 3 AND 2

LTAQ	5
LCUMP	2
LECON	0
LTAPE	0
JPLT	0
JPKI	0
JNAAT	1
JSTAVE	0
JAUCL	0

REFUGEE FOR PAGE LAKE JAM

TABLE	ICOMP	IECON	IFAPC	JPLI	JPRF	IMHMT	IMJAL	TABLE
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	1	11	11	11	11	11	11	11

ROUTING DATA		ROUTING DATA	
WLUSS	AVG	WLUSS	AVG
0-0	0-0	0-0	0-0
0-1	0-1	0-1	0-1
0-2	0-2	0-2	0-2
0-3	0-3	0-3	0-3
0-4	0-4	0-4	0-4
0-5	0-5	0-5	0-5
0-6	0-6	0-6	0-6
0-7	0-7	0-7	0-7
0-8	0-8	0-8	0-8
0-9	0-9	0-9	0-9
1-0	1-0	1-0	1-0
1-1	1-1	1-1	1-1
1-2	1-2	1-2	1-2
1-3	1-3	1-3	1-3
1-4	1-4	1-4	1-4
1-5	1-5	1-5	1-5
1-6	1-6	1-6	1-6
1-7	1-7	1-7	1-7
1-8	1-8	1-8	1-8
1-9	1-9	1-9	1-9
2-0	2-0	2-0	2-0
2-1	2-1	2-1	2-1
2-2	2-2	2-2	2-2
2-3	2-3	2-3	2-3
2-4	2-4	2-4	2-4
2-5	2-5	2-5	2-5
2-6	2-6	2-6	2-6
2-7	2-7	2-7	2-7
2-8	2-8	2-8	2-8
2-9	2-9	2-9	2-9
3-0	3-0	3-0	3-0
3-1	3-1	3-1	3-1
3-2	3-2	3-2	3-2
3-3	3-3	3-3	3-3
3-4	3-4	3-4	3-4
3-5	3-5	3-5	3-5
3-6	3-6	3-6	3-6
3-7	3-7	3-7	3-7
3-8	3-8	3-8	3-8
3-9	3-9	3-9	3-9
4-0	4-0	4-0	4-0
4-1	4-1	4-1	4-1
4-2	4-2	4-2	4-2
4-3	4-3	4-3	4-3
4-4	4-4	4-4	4-4
4-5	4-5	4-5	4-5
4-6	4-6	4-6	4-6
4-7	4-7	4-7	4-7
4-8	4-8	4-8	4-8
4-9	4-9	4-9	4-9
5-0	5-0	5-0	5-0
5-1	5-1	5-1	5-1
5-2	5-2	5-2	5-2
5-3	5-3	5-3	5-3
5-4	5-4	5-4	5-4
5-5	5-5	5-5	5-5
5-6	5-6	5-6	5-6
5-7	5-7	5-7	5-7
5-8	5-8	5-8	5-8
5-9	5-9	5-9	5-9
6-0	6-0	6-0	6-0
6-1	6-1	6-1	6-1
6-2	6-2	6-2	6-2
6-3	6-3	6-3	6-3
6-4	6-4	6-4	6-4
6-5	6-5	6-5	6-5
6-6	6-6	6-6	6-6
6-7	6-7	6-7	6-7
6-8	6-8	6-8	6-8
6-9	6-9	6-9	6-9
7-0	7-0	7-0	7-0
7-1	7-1	7-1	7-1
7-2	7-2	7-2	7-2
7-3	7-3	7-3	7-3
7-4	7-4	7-4	7-4
7-5	7-5	7-5	7-5
7-6	7-6	7-6	7-6
7-7	7-7	7-7	7-7
7-8	7-8	7-8	7-8
7-9	7-9	7-9	7-9
8-0	8-0	8-0	8-0
8-1	8-1	8-1	8-1
8-2	8-2	8-2	8-2
8-3	8-3	8-3	8-3
8-4	8-4	8-4	8-4
8-5	8-5	8-5	8-5
8-6	8-6	8-6	8-6
8-7	8-7	8-7	8-7
8-8	8-8	8-8	8-8
8-9	8-9	8-9	8-9
9-0	9-0	9-0	9-0
9-1	9-1	9-1	9-1
9-2	9-2	9-2	9-2
9-3</			

104IPS	NSUL	LAU	AMSK	X	ISK	STOKA	ISPMI
1	0	0	0.0	0.0	0.0	-1431	-1

STATE	1433.00	1434.50	1435.20	1436.00	1437.20	1438.00	1439.10
-------	---------	---------	---------	---------	---------	---------	---------

[illegible]

SURFACE AREA	97.	105.	115.	274.
--------------	-----	------	------	------

CAPACITY:	0.	171.	1936.	6388.
-----------	----	------	-------	-------

ELEVATION? 1423. 1733. 1940. 1460.

	RLL	SPWD	LUM	EXP	ELEV	LOUL	LAKA	LAPT
	1833.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TYPE	CUQJ	EXPJ	DAMJUD
1436.2	3.1	1.2	162.

CREST LENGTH AT OR BELOW ELEVATION	0.	37.	86.	125.	185.	197.	203.	213.
	1436.2	1436.5	1437.0	1437.5	1438.0	1438.5	1439.0	1439.5

PLEASE OUTFLIGHT IS 032. AT 14.4E 9.00 HOURS

MIYURC KAPH RUJING

RJJI14, IIRJ CHANNEL TO PUKUY PUKU

ISTAQ	ICOMP	IECUN	IIAPE	JPLI	JPRY	INATE	ISIAE	IAUJU
7	1	0	0	0	0	1	0	0

CLASS	AVG	RES	ISAME	LUPT	IFMP	LUSTR
1.0	0.0	1	1	1	1	1
2.0	0.0					

75TPS	NSIDL	LAG	AMSK	X	YSK	STORA	ISPHAT
1	0	0	0.0	0.0	0.0	0.	0

NORMAL DEPTH CHANNEL ROUTING.

JN(1)	JN(2)	JN(3)	ELCVI	ELMAX	RLVTH	SLI
0.1600	0.0000	0.0000	1400.0	1400.0	2000.0	0.00000

DATE	COMP	RECN	ITAP	JPL	JPA	INATE	ISAGE	TAUT
9	2	0	0	0	0	1	0	0

[illegible]

## HYUKUGRAPIH RUJIANIG

R.J.J.I.L.L. FOR PURUY DAM

ISSTAQ	ICUMP	IECON	ITAPE	JPLT	JPRT	INAME	ISAGE	IAUTU
10	1	0	0	0	0	1	0	0

ROUTING DATA			
AVG	IRCS	ISAME	IUPT
0.0	1	1	0

ICLASS	IPMP	LSIR
0.0	0	0

45TPS	INSTUL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	-1409.	-1

STAFF	1,099.00	1,099.70	1410.50	1411.30	1412.00	4412.70
FL04	0.00	22.10	62.40	115.70	176.70	246.70

SURFACE AREA=	11.	12.	39.	69.
11.	11.	12.	39.	69.

CAPACITY= 0. 54. 318. 1378.

ELEVATION=	1404.	1409.	1420.	1440.
------------	-------	-------	-------	-------

REL	SPMD	CUQM	EXPW	ELEVL	LUQL	LAKEA	LXPL
0.097	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA		
TOPEL	CUQD	EXPJ DAMNO
1409.6	3.1	1.5 66.

[illegible]

ELEVATION	1409.0	1410.0	1410.5	1411.0	1411.5	1412.0	1412.5	1413.0
1409.0								
1410.0								
1410.5								
1411.0								
1411.5								
1412.0								
1412.5								
1413.0								

PEAK WJFL 14 IS 1774. AT 114E 7.50 HOURS

SHEET 19 of 23

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLJMS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN RATIO	1
				1.00
HYDROGRAPH AT	1	3.92	1	1076.
		2.461		30.481
ROUTED TO	2	3.92	1	631.
		2.461		17.871
ROUTED TO	3	3.92	1	555.
		2.461		15.711
HYDROGRAPH AT	4	3.81	1	2638.
		1.321		74.691
2 COMBINED	5	4.23	1	3057.
		12.381		86.511
ROUTED TO	6	4.73	1	832.
		12.381		23.551
ROUTED TO	7	4.76	1	831.
		12.381		23.521
HYDROGRAPH AT	8	4.82	1	1580.
		4.751		44.751
2 COMBINED	9	5.63	1	1886.
		17.171		53.401
ROUTED TO	10	5.64	1	1774.
		17.171		50.231

PLAY | **WILLIE LARK DART**

PLAY	RATIO OF PWF	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM WUFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX WUFLOW HOURS	TIME OF FAILURE HOURS
100%	1.00	0.56	128.	631.	1.67	7.00	6.0

PLAN 1		STATION 3	
RATIO	MAXIMUM FLOW, CFS	MAXIMUM STACK, FT	TIME HOURS
1.00	555.	1084.3	7.33

# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 *PROG. HERE. PLAN*

ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	1434.00	1433.00	1430.20
OUTFLOW	971.	971.	1348.
	0.	0.	713.

RATIO OF PHF	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.31	1391.	832.	2.67	9.00	0.0

PLAN 1 STATION 7

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
1.00	831.	1419.9	9.17



# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 *Brook River Dam*

RATIO OF PMT	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF	
						MAX OUTFLOW HOURS	FAILURE HOURS
1.00	1413.92	4.32	136.	1774.	40.83	7.50	0.0

*100-YEAR Flood Routing*

ELEVATION STORAGE	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
54.	1409.00	1409.00	1409.60
OUTFLOW	0.	54.	82.
		0.	19.

APPENDIX E

PLATES

## CONTENTS

Plate 1 - Location Plan

Plate 2 - Watershed Map

Plate 3 - Field Sketch Plan from Field Inspection

Plate 4 - Top of Dam Profile and Typical Cross Section  
from Field Inspection

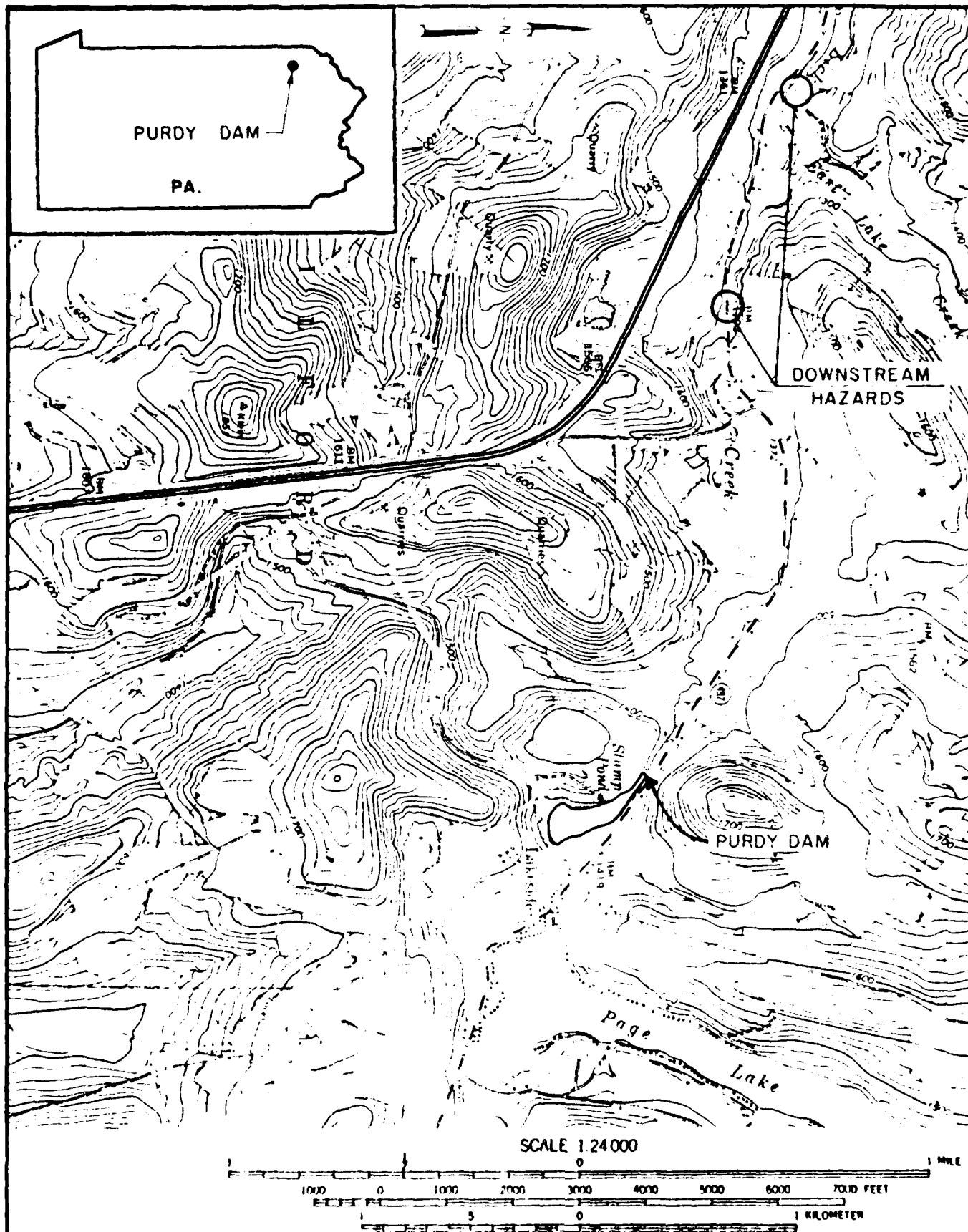
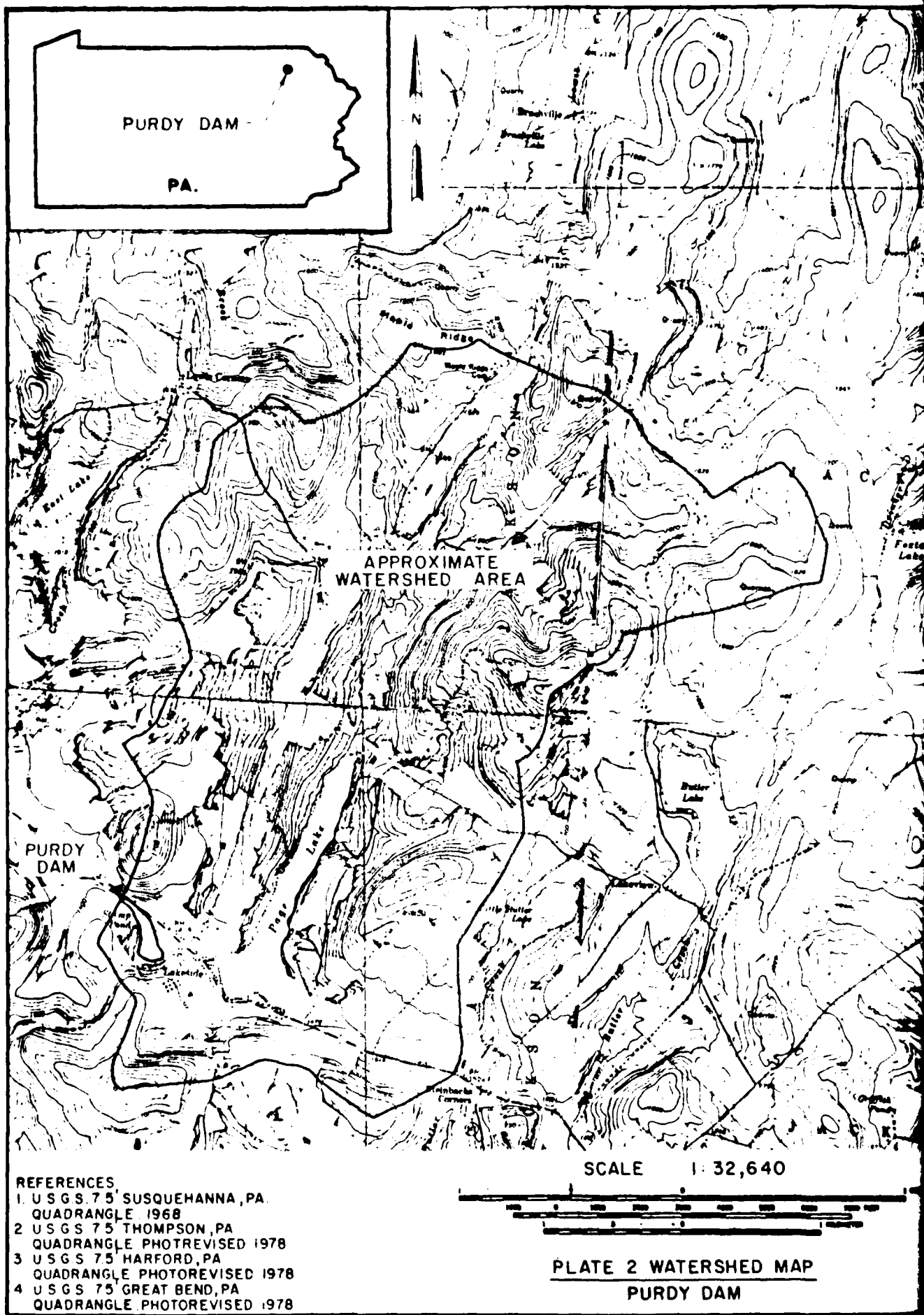
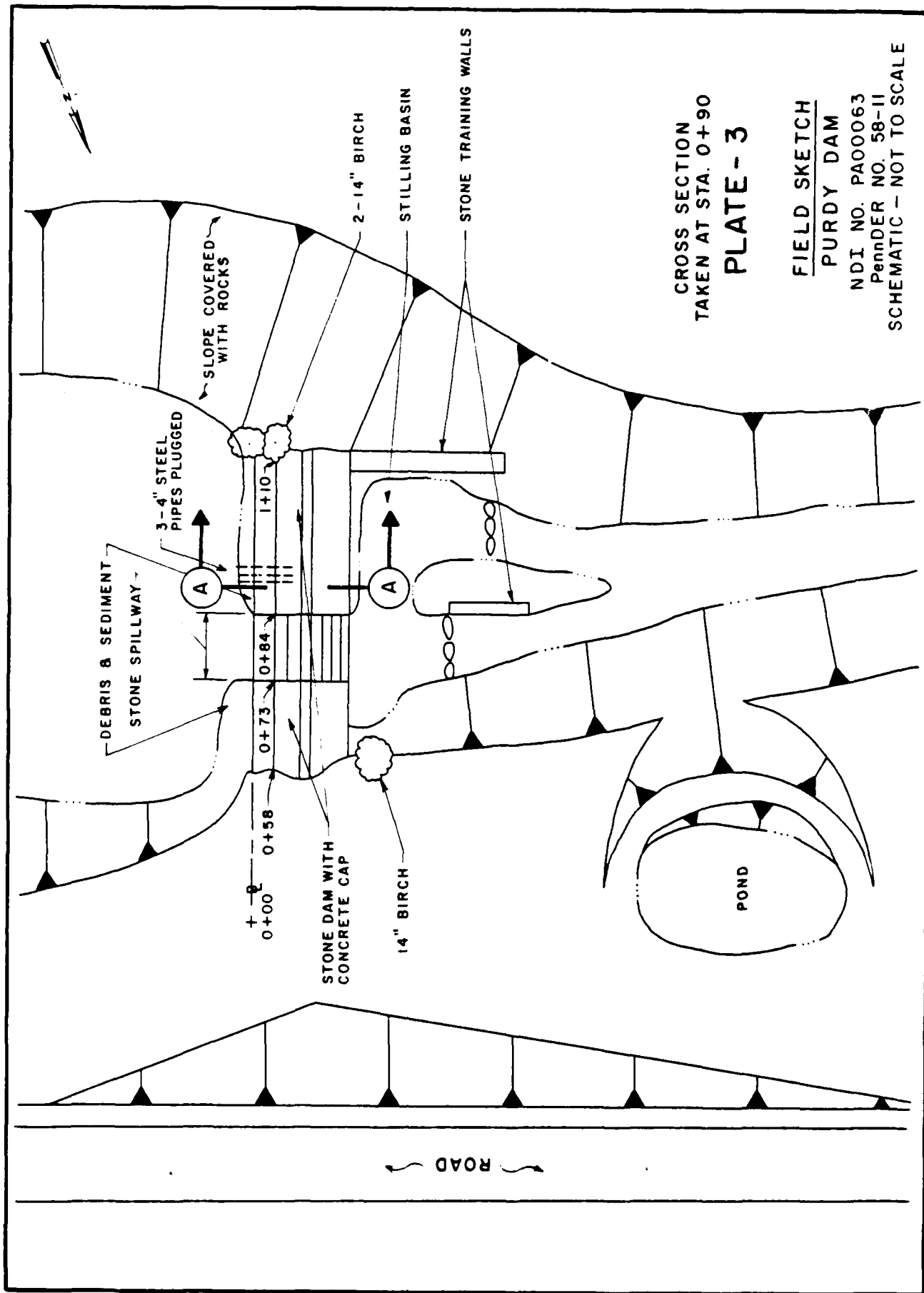


PLATE I LOCATION PLAN  
PURDY DAM

REFERENCES:  
1 USGS 7.5 HARFORD, PA.  
QUADRANGLE PHOTOREVISED 1978



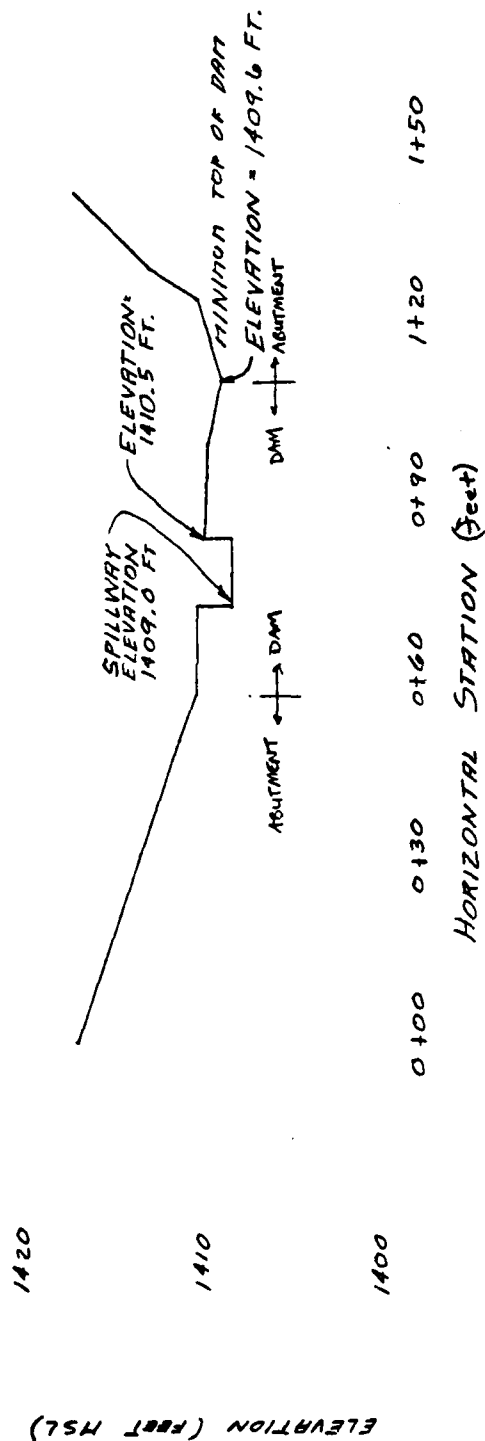
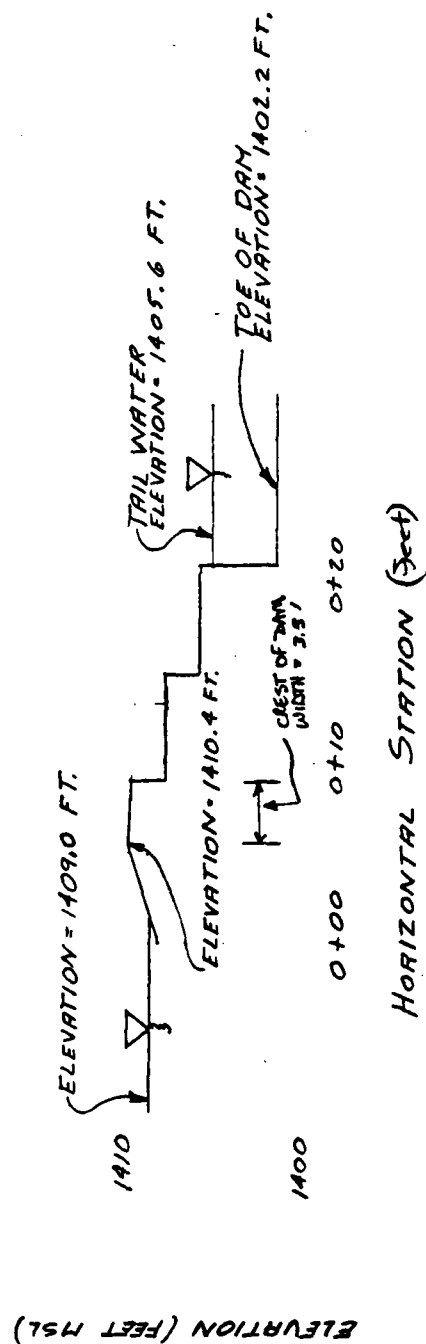


CROSS SECTION  
TAKEN AT STA. 0+90

PLATE - 3

FIELD SKETCH  
PURDY DAM

NDI NO. PA00063  
PENNS. NO. 58-II  
SCHEMATIC - NOT TO SCALE

TOP OF DAM PROFILE (LOOKING UPSTREAM)TYPICAL CROSS SECTION

APPENDIX F

REGIONAL GEOLOGY

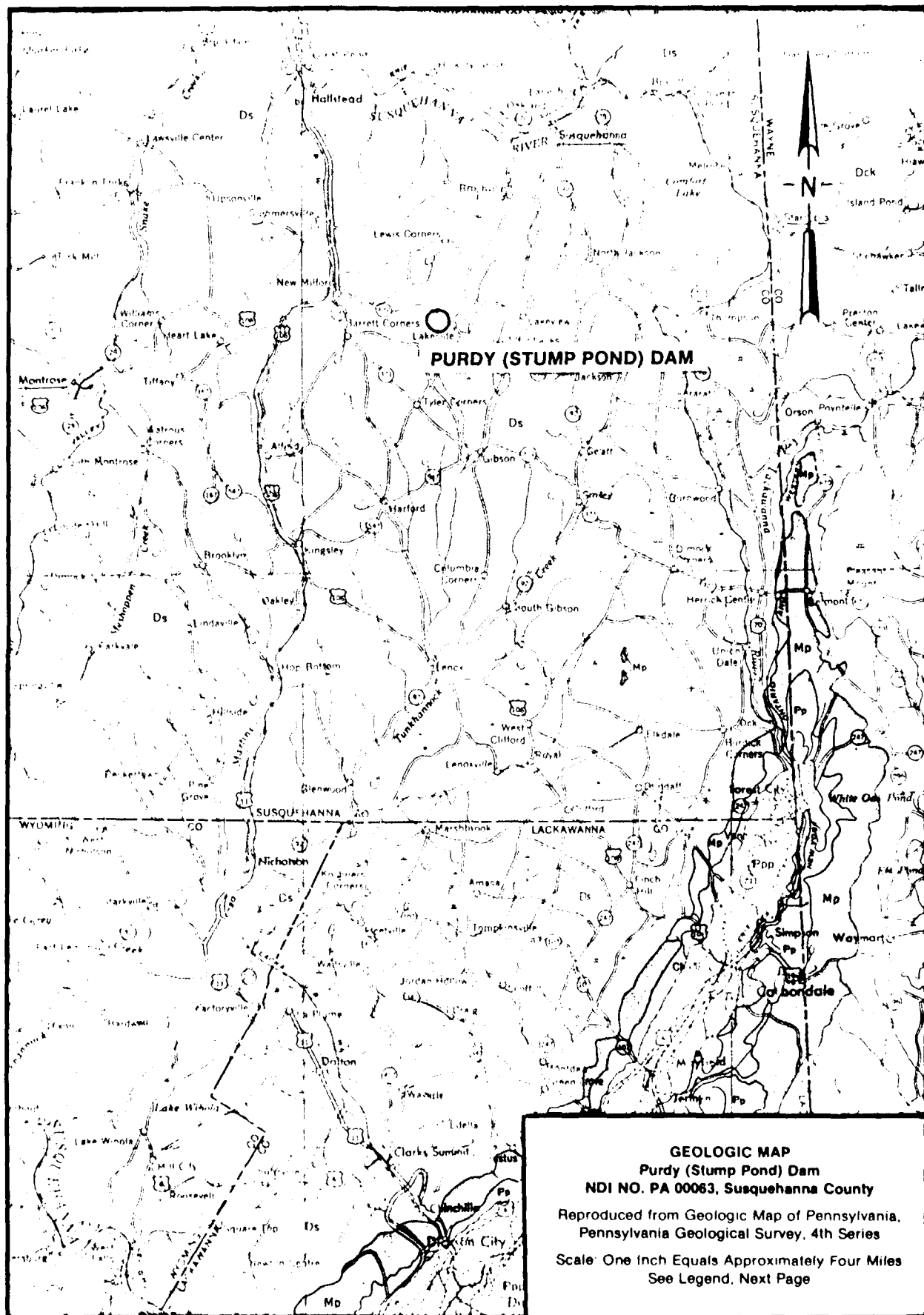


PURDY (STUMP POND) DAM  
NDI No. PA 00063, PennDER No. 58-11

REGIONAL GEOLOGY

Purdy Dam is situated in the Glaciated Low Plateaus physiographic province. The area has undergone glaciation at least three times and is presently covered with Wisconsin stage glacial deposits. According to the Soil Conservation Service's Soil Survey for Susquehanna County, the surface soils consist primarily of slightly stoney, silt loams of the Morris-Wellsboro-Volusia association. No test boring data were available for review, thus, the thickness of this overburned is difficult to ascertain.

Geologic references indicate that the bedrock in the vicinity of the dam consists primarily of members of the Catskill Formation in the Susquehanna Group. These are chiefly red and gray shales and sandstones of Upper Devonian age. The formation also contains scattered, thin, coal streaks and scattered fish remains. A bedrock sample obtained at the dam site was a hard olive green, fine grained sandstone. The strata in the area were deposited in a bay or delta front environment and remained essentially horizontal after the Appalachian Uplift.



# GEOLOGY MAP LEGEND

## DEVONIAN UPPER

### WESTERN PENNSYLVANIA

- Oswayo Formation**  
Greenish gray to gray shales, sandstones and siltstones, becoming increasingly shaly westward, considered equivalent to type Oswayo. Rensselaer Formation of the Erie and Crawford Counties probably not distinguishable north of Perry.
- Cattaraugus Formation**  
Red, gray and brown shale and sandstone with the purple and red streaking westward, includes Venango, Seneca, Steuben and Salamanca sandstones and conglomerates, some limestone in the east and Erie counties.
- Conneaut Group**  
Alternating gray, brown, greenish and purple shales and sandstones, includes dark rock of drab and "Chenango" and "Grand" Formations of northeastern Pennsylvania.
- Canadaway Formation**  
Alternating brown shales and sandstones, includes "Portage" Formation of northwestern Pennsylvania.

### CENTRAL AND EASTERN PENNSYLVANIA

- Oswayo Formation**  
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous eastward. Relation to type Oswayo not proved.
- Catskill Formation**  
Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone lenses named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.
- Marye beds**  
Gray to olive brown shales, graywackes, and sandstones, contains "Chenango" beds and "Portage" beds including Bucklet, Butler, Harrell, and Trimmers. Bucklet Limestone at base.

### Susquehanna Group

Barbed line is "Chenango-Catskill" contact of Second Pennsylvania Survey. County reports barbed line "Chenango" side of line.

## MIDDLE AND LOWER

### Hamilton Group

- Mahantango Formation**  
Brown to olive shale with interbedded sandstones which are dominant in places (Montebello), highly fossiliferous in upper part, contains "Centerfield coral bed" in eastern Pennsylvania.
- Marcellus Formation**  
Black, fissile, carbonaceous shale with thick brown sandstone (Turkey Ridge) in parts of central Pennsylvania.
- Onondaga Formation**  
Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places, includes Selinagrace Limestone and Needmore Shale in central Pennsylvania and Enopus Shale in northeastern Pennsylvania, in Lehigh Gap area includes Palmerston Sandstone and Bowmanstown Chert.
- Oriskany Formation**  
White to brown, fine to coarse grained, partly micaceous, locally conglomeratic, fossiliferous sandstone (Oriskany) at the top, dark gray, cherty limestone with some interbedded shales and sandstones below (Oriskany).
- Helderberg Formation**  
Dark gray, calcareous, thin bedded shale (Mandata) at the top, equivalent to Port Kisco Shale and Becraft Limestone in the east, dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle and at the base, dark gray, medium to thick bedded, crystalline limestone (Lancaster) in the middle and at the base, with some cherty nodules.

**DAI  
FILM**